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HONEYWELL TECHNALYSIS

HONEYWELL INC.
Minneapolis, Minn. 55408

INDOOR AIR QUALITY:
A NATIONAL SURVEY
OF
OFFICE WORKER ATTITUDES

Sponsored by
HONEYWELL TECHNALYSIS
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SUMMARY

Office workers rank lighting, temperature, and air quality as the top three factors when considering what makes an office a productive place in which to work. And two of these important factors -- temperature and air quality -- are also considered at least somewhat serious problems by a plurality of office workers. In responding to these and later questions, women were consistently more critical and less satisfied than men with their general office environment. (Section 1)

Office workers are generally satisfied with air quality in the workplace. But a significant minority (24%) complain that cigarette smoke, poor ventilation, and pollution are primarily responsible for "only fair" or "poor" air quality where they work. Of the total office worker population surveyed, over half believe that better air quality would result in a more productive work environment. (Sections 2, 3)

One in five office workers say that air quality often or sometimes interferes with their ability to do their job. These workers reaffirm that the main problems with the air quality where they work are

- poor ventilation
- inadequate heating or cooling
- cigarette smoke. (Section 4)

Overall, more than two-thirds (67%) of office workers give top management a favorable review for its concern about the issue of air quality in the office. Support for management is strongest among those who enjoy excellent air quality and good working conditions. Thus, women, who are more likely to operate under conditions less conducive to good air quality, are somewhat more critical of management's efforts. But even among women, a 59% majority consider top management to be "very" or "somewhat" concerned about air quality in the office. (Section 5)

Women are more likely than men both to have difficulty doing their job because of poor air quality and to say management is not concerned about air quality. Several ways in which their working conditions differ from those of men may be partially responsible for their more negative perception of air quality. Women are, for example, more likely

- to work in open offices
- to work in areas without windows
- to spend more than one-half their time at a computer terminal. (Section 6)

According to office workers, just over four in ten offices today are equipped with facilities to clean or filter the air. Tenants in newer buildings are more likely to enjoy this feature than those in buildings that are 20 years of age or older. In more than one-half of the cases (58%), air cleaners are perceived to be part of the air conditioning or heating system -- with the remaining units being evenly split between large floor or ceiling cleaners and small desk-top models. Windows are reported to be a standard feature in two out of three offices or work areas. (Section 7)

METHODOLOGY

This analysis reports the findings of a survey of worker attitudes toward the office environment. The tables show the responses of all participants and -- when these are statistically significant as indicated on page 7 -- the responses of specific demographic groups. In some tables, responses may not add up to 100% either because multiple responses were permitted or because percentages were rounded off to whole numbers.

The survey questionnaire was developed, designed, and analyzed by Public Attitudes, the research division of Carl Byoir and Associates. Interviews were conducted between August 29 and September 19, 1984, by International Communications Research of Media, Pennsylvania.

Office workers

This survey was conducted among a random selection sample of adult Americans that

- are 18 years of age or older
- currently work outside their home more than 20 hours a week in an office or in an office-type setting (that is, at a desk, table, or computer terminal)
- work in an office-type setting in which five or more persons are employed.

In all, the questionnaire was administered to 600 office workers with these characteristics.

Sampling procedure

To ensure that the responses elicited from the sample were statistically representative of office workers nationwide, the following sampling procedure was used:

(1) Because several persons in a household may be office workers, the ratio between male and female office workers was estimated through a preliminary pretest. This ratio was then adjusted to reflect the actual population of males and females in the United States. A quota system was used to ensure that the final sample would accurately represent the actual percentages of male and female office workers nationwide.

(2) To avoid over-representing any geographical area, stratified random sampling was employed, with an independent random sample drawn from within each stratum. In this case, nine strata were defined to agree with the nine Census Divisions (excluding Alaska and Hawaii), and interviews were allocated proportional to each of these nine Divisions.

(3) Contacts were made using random digit dialing, a technique whereby a computer randomly generates telephone numbers in order to avoid interviewing only those with listed and published telephone numbers.

(4) Telephone calls were made to households on weekday evenings. They were controlled by time zone so that all calls were initiated between 5:00 p.m. and 9:30 p.m. local time in each time zone.

(5) Once a contact was made, potential respondents had to pass a series of screening questions in order to be eligible for inclusion in the survey. The screen was designed to ensure that all participants met the definition of "office worker" described in the previous section.

On average, the "screening" questions took three minutes to administer. Once the respondent had been selected, the actual interview required approximately seventeen minutes to complete.

Sampling tolerances

All random sample surveys are subject to a "sampling error" -- that is, the extent to which the actual results may differ from the results that we would have obtained if we had interviewed the whole population from which the sample was drawn. The size of such sampling errors depends largely on the number of interviews conducted.

The following tables may be used in estimating sampling error. They indicate the range (plus or minus the figure shown) within which the results of repeated samplings in the same time period could be expected to vary 95% of the time, assuming that the same sampling procedure, the same interviewers, and the same questionnaire were used. (That is, the chances are 95 in 100 that the sampling error is not larger than the figures shown.)

Table A shows how much allowance should be made for the sampling error of a percentage in tables reporting the aggregated responses of the entire stratified random sample among 600 office workers.

TABLE A

Recommended allowance for sampling error of a percentage -- entire sample (600)

(In percentage points at 95 in 100 confidence level)

percentages near	possible error (+)
10%	2.4%
20	3.3
30	3.7
40	4.0
50	4.1
60	4.0
70	3.7
80	3.3
90	2.4

In comparing survey results in two subsamples -- such as men and women -- how large must a difference between the two results be before one can be reasonably sure that it reflects a real difference? Table B indicates the number of percentage points which must be allowed for when comparing the opinions expressed by two subsamples.

TABLE B

Recommended allowance for sampling error of the difference between two subsamples

(In percentage points at 95 in 100 confidence level)

percentages near 20 or percentages near 80

Size of subsample	500	400	300	200	100
500	-	-	-	-	8.6%
400	-	-	-	6.8	8.8
300	-	-	6.4	7.1	9.0
200	-	6.8	7.1	7.8	9.6
100	8.6	8.8	9.0	9.6	11.1

percentages near 50

500	-	-	-	-	10.7%
400	-	-	-	8.5	11.0
300	-	-	8.0	8.9	11.3
200	-	8.5	8.9	9.8	12.0
100	10.7	11.0	11.3	12.0	13.9

ANALYSIS

1. The office environment

In this benchmark survey on air quality in the office, the opening questions sought to determine the role air quality plays in contributing to a productive office environment. While not the most frequently mentioned item, the nature of the air is indeed among the top three factors (after lighting and temperature) that office workers cite as having an impact on their productivity.

In a follow-up question about potential problem areas, air quality is situated about midway between the most important concerns (temperature and noise) and the least important ones (lighting and dirty surroundings). This position foreshadows later findings, which suggest that office workers might well be responsive to improvements in air quality, but they are not likely to take an activist role in requesting improvements in this area.

Office workers do consider air quality an important ingredient in creating a productive working environment, but they do not consider it a critical problem. Thus the survey suggests that it is up to management to be a self-starter when it comes to improving the physical comfort of its workers by providing better air quality. Later findings show that, at the very least, workers acknowledge management efforts in this area, and the opening questions in the survey suggest that management efforts to improve air quality will lead to greater productivity.

Respondents were first asked to consider a number of things that may contribute to making an office or work area a productive place in which to work. More than two out of three respondents cite lighting (87%), temperature (78%), and air quality (68%) as "very" important factors affecting the office environment. Not far behind is overall housekeeping -- how clean and orderly the office is -- which is mentioned as very important by 63% of office workers.

While factors relating to privacy and prestige rank below these fundamental items affecting physical comfort, they are still considered "very" important by large numbers of office workers. Over half say the size of the office or workspace (56%) and quiet (55%) are of paramount importance, and another 41% feel distance to co-workers is very important in helping to create a productive environment. The only aesthetic factor listed -- whether the office has been recently redecorated -- is seen as comparatively less important, being cited by just over a quarter of respondents (27%) as a very important factor in helping to increase office productivity.

Women are more likely than men to rank each of the preceding eight items as very important in making the work area a productive place. In four cases, these differences are particularly striking:

- the size of the office or workspace (among women 68% say this is very important, among men only 49%)
- whether the office has been recently redecorated (women 38%, men 22%)
- temperature (women 87%, men 73%)
- overall housekeeping (women 71%, men 58%)

In contrast, the gap between the sexes narrows considerably regarding two issues affecting office productivity:

- quiet (women 57% very important, men 54%)
- how close you are in distance to other workers (women 45%, men 38%).

TABLE 1

Question. Many things can help to make an office or work area a productive place to work in -- that is, a place where you can get your work done quickly and efficiently. Do you personally feel that [each item listed] is very, somewhat, not very, or not at all important in helping to make an office or workspace a productive place to work?

	very important	somewhat important	not very important	not at all important	not sure
lighting	87%	11%	1%	1%	-
temperature	78	20	2	-	-
the nature of the air	68	25	5	1	2
overall housekeeping	63	31	5	1	1
the size of the office or workspace	56	37	5	2	1
quiet	55	35	6	3	2
how close you are in distance to other workers	41	44	9	5	2
whether the office has been recently redecorated	27	42	20	10	1

Base. All respondents (600).

In order to determine how the physical environment of the workplace affects office workers, respondents next were asked about five things that people working in offices may or may not see as problems. Notably, none of the five items mentioned is considered by a majority as a "very" or "somewhat" serious problem where they work. However, about four in ten office workers do say that temperature (47%), noise (41%), and air quality (39%) are at least somewhat serious problems for them. It is interesting to note that lighting, which was earlier cited as the number one factor affecting office worker productivity, is well down the list of problem areas. Slightly less than one-third (32%) of office workers mention lighting as a very or somewhat serious problem. An equal number (32%) cite dirty surroundings.

TABLE 2

Question. And here are some things that people working in offices may or may not consider problems. In the office or area where you work is/are [each item listed] a very, somewhat, not very, or not at all serious problem?

	very serious	somewhat serious	not very serious	not at all serious	not sure
temperature	19%	28%	20%	33%	1%
noise	16	25	21	37	1
air quality	18	21	18	44	-
lighting	18	14	16	52	-
dirty surroundings	17	15	20	49	-

Base. All respondents (600).

2. How workers perceive air quality in the office

Most office workers seem highly satisfied with air quality in the workplace. But a detailed examination of their attitudes reveals a significant negative response as well.

On the whole, office workers express a high level of satisfaction with the air quality where they work. Nearly one in three (32%) consider the air quality to be "excellent" and another 44% rate it as "good." But 24% express dissatisfaction with air quality, saying it is "only fair" (18%) or "poor" (6%).

Thus nearly one in four of those surveyed rate the air quality where they work no better than fair or poor. These workers have little trouble coming up with specific reasons for their evaluation. Cigarette smoke, poor ventilation, and pollution are blamed most often for having a negative impact on air quality. Notably all of these problems have solutions -- ranging from the relatively simple designation of smoking/no smoking areas to the more complex installation of air conditioners or cleaners.

Improving air quality may well increase productivity. Over half of the workers surveyed think that better air quality would make their office a more productive place to work in. Women, who are more critical than men on air quality issues, are also among the most ardent supporters of this concept and are likely to be highly receptive to management efforts to improve air quality.

Three variables seem to influence how office workers perceive air quality where they work. Among those more likely to be critical of air quality in the office are

- women
- those who work in crowded workspaces
- those who occupy buildings that are 20 or more years old.

TABLE 3

Question. Just in general -- do you feel the air quality where you work is excellent, good, only fair, or poor?

	excellent	good	only fair	poor	don't know
All respondents	32%	44%	18%	6%	1%
Gender					
male	35%	45%	14%	4%	1%
female	25	43	25	9	-
How crowded work area is					
very/somewhat crowded	19%	44%	25%	10%	1%
not very/not at all crowded	39	45	13	3	-
Age of building					
1-10 years	38%	42%	14%	5%	1%
11-19 years	32	44	19	4	1
20 or more years	24	47	21	8	1

Base. All respondents (600).

An overwhelming majority (82%) of office workers say that there has been no real change in the air quality where they work during the past year. Where there has been a change, three times as many say it has been for the better (13%) as say it has been for the worse (4%). These responses are consistent with the earlier finding that over three-quarters of office workers surveyed consider the air quality where they work to be excellent (32%) or good (44%).

TABLE 4

Question. Just during the past year, has the overall air quality where you work become much better, somewhat better, somewhat worse, or much worse; or has there been no real change?

much/somewhat better	13%
much better	5
somewhat better	8
somewhat/much worse	4%
somewhat worse	3
much worse	1
no real change	82%
(don't know)	1%

Base. Those who have worked in their current office for at least one year (581).

However, it is striking that despite this extremely rosy picture, a 53% majority of respondents think that better air quality would be very (23%) or somewhat (30%) helpful in making their office a more productive place in which to work.

Women (65%) once again insist more strongly than men (47%) that correcting existing problems in the office (in this case, air quality) would result in higher productivity. Other respondents that are more likely to feel better air quality would improve their productivity include workers that

- say they now contend with "only fair" or "poor" air quality in their office
- often or sometimes have difficulty working because of air quality
- are in very or somewhat crowded work areas
- work in open offices.

TABLE 5

Question. Overall, if the air quality where you work were better than it is now, would better air quality be very, somewhat, not very, or not at all helpful in making your office a more productive place to work in?

	very helpful	somewhat helpful	not very helpful	not at all helpful	don't know
All respondents	23%	30%	16%	28%	4%
Gender					
male	18%	29%	17%	31%	5%
female	32	33	14	22	1
General air quality in office					
excellent	15%	21%	16%	40%	7%
good	14	32	21	30	3
fair/poor	47	39	6	8	1
Have difficulty doing job because of air quality					
often/sometimes	57%	35%	4%	4%	-
rarely/never	14%	29	19	34	4
How crowded work area is					
very/somewhat crowded	27%	36%	15%	19%	3%
not very/not at all crowded	19	26	17	33	4
Type of work area					
fully enclosed	20%	25%	17%	33%	5%
semi-enclosed	21	37	18	24	1
open area	30	34	12	22	3

Base. All respondents (600).

A majority of respondents believe that better air quality would improve conditions where they work. However, only 5% of all office workers surveyed say that they or other people where they work have asked their company to install an air cleaner.

TABLE 6

Question. Have you or other people where you work asked your company to install an air cleaner?

yes	5%
no	86
(don't know)	9

3. What helps or hinders good air quality?

Respondents were asked to state in their own words the reasons for their evaluation of the air in their own office. What emerges is a very consistent set of attitudes about what positively and negatively affects office air quality.

We looked first at the responses of the 24% among office workers that say their air is "only fair" or "poor." Cigarette smoke and poor ventilation are most frequently cited by one-third of this group as reasons for their complaints. Pollution is also high on the list of volunteered reasons. Exactly one in five (20%) of office workers identify factors such as noise, chemical, or industrial pollution. Temperature fluctuations, mentioned by 19%, also contribute to a negative evaluation, while building design that eliminates windows is criticized for restricting the flow of fresh air (18%). The only other causes of bad air volunteered by at least one in ten respondents are odors in the air (13%), unreliable air conditioning (12%), and unspecified agents that cause physical side effects such as burning eyes.

TABLE 7

Question. [If respondent says that the air quality where they work is ONLY FAIR or POOR]. Why do you feel that the air quality where you work is [only fair or poor]? [Respondents answered in their own words. Up to three responses were permitted.]

NEGATIVE RESPONSES

cigarette smoke	34%
poor circulation/ventilation	34
pollution (including noise/chemical/industrial pollution)	20
temperature fluctuations	19
lack of fresh air/unable to open windows	18
odors in the air (unspecified)	13
unreliable air conditioning	12
condition of air causes physical side effects (burning eyes, etc.)	10
dust/dirt	8
humidity is too high	4
small work place	1
other negative responses	2

NON-RESPONSES

don't know	3%

Base. Those saying that the air quality where they work is only fair or poor (142).

The 76% of office workers that feel air quality in their office is "excellent" or "good" also volunteer specific reasons for their evaluation. Their answers are virtually the opposite of those given by their dissatisfied colleagues.

At the top of the list they volunteer not having to contend with a lot of cigarette smoke as the reason they give a positive rating to the air quality where they work. Almost one in three (31%) of all satisfied workers mention this factor. Later findings (Table 13) show that management can take some credit in this regard for designating smoking and no-smoking areas or for prohibiting smoking altogether.

Air conditioning (24%) and adequate ventilation (23%) are each prominently mentioned by about one in four respondents. These satisfied workers also indicate an awareness that the air they work in is clean or filtered (24%), free of noise, chemical, or industrial pollution (13%), and is not subject to temperature fluctuation (12%).

TABLE 8

Question. [If respondent says that the air quality where they work is EXCELLENT or GOOD]. Why do you feel that the air quality where you work is [excellent or good]? [Respondents answered in their own words. Up to three responses were permitted.]

POSITIVE RESPONSES

no/not a lot of cigarette smoke	31%
have air conditioning/reliable air conditioning/central heating and air system	24
air is clean/filtered	24
adequate air circulation/ventilation	23
no pollution (including noise/chemical/industrial pollution)	13
even temperature/no temperature fluctuations	12
no problems (unspecified)	10
no bad odors	7
condition of air does not cause physical side effects/affect allergies	6
fresh air available/windows open	5
environment is comfortable/pleasant (unspecified)	5
good natural environment (trees, plants, etc.)	4
work area is uncrowded	3
other positive responses	2

NON-RESPONSES

don't know	2%

Base. Those saying that the air quality where they work is excellent or good (455).

4. The nature of problems with air quality in the office

One of the key findings in this survey is that most office workers express a relatively high degree of satisfaction with air quality in the office. Most do not consider air quality even a somewhat serious problem. And most do not have difficulty doing their work because of air quality.

Despite these positive impressions, one in five office workers say they do have trouble doing their job because of the nature of the air in their office. It is to this group that we look to establish the dimension of the problem of below par air quality in the office. These workers reaffirm once again that the key problems with air quality in the office are poor ventilation, inadequate heating or cooling, and cigarette smoke.

It is significant that office workers can readily identify the reasons they perceive air quality in the office to be good or bad (as reported in Section 2) and the reasons why substandard air quality hinders their work effort. Thus, management need look no farther than its own staff for first hand views about air quality problems in the office.

Since most office workers express high satisfaction with the air quality in their office, it comes as no surprise that the vast majority (81%) say they rarely (19%) or "never" (62%) have difficulty doing their work because of air quality. However, one in five office workers contend that air quality "often" (3%) or "sometimes" (17%) hampers their work effort.

Three groups of office workers stand out as being more susceptible to having problems doing their job because of the air quality in the area where they work. Again women and respondents who work in crowded conditions are twice as likely as men or those who do not feel crowded to "often" or "sometimes" have difficulty doing their work because of air quality. Office workers in open areas also register a higher level of difficulty than those in semi-enclosed or fully enclosed areas.

TABLE 9

Question. Do you personally often, sometimes, not very often, or never have difficulty doing your work because of the air quality in the office or area where you work?

	often	sometimes	not very often	never
All respondents	3%	17%	19%	62%
Gender				
male	2%	13%	18%	68%
female	4	24	20	51
How crowded work area is				
very/somewhat crowded	4%	24%	22%	50%
not very/not at all crowded	2	12	17	70
Type of work area				
fully enclosed	1%	15%	16%	67%
semi-enclosed	1	16	23	60
open area	6	19	21	54

Base. All respondents (600).

In order to assess the dimension of the problem caused by below par air quality, the one in five respondents who said they have difficulty doing their job because of air quality were asked about 23 problems that may arise from the nature of the air in the workplace.

The data here are consistent with earlier findings which show that poor ventilation is a key factor contributing to a perception of substandard air quality in the office. Among these 23 items, "lack of air movement" is most frequently cited as a problem: 67% consider it "very" or "somewhat" serious. It is followed by two related complaints: "a tired, sleepy feeling" (56%) and "stagnant or still air" (55%).

Over half the respondents say that being too hot in the summer (61%) or too cold in the winter (53%) is at least a somewhat serious problem where they work. The irritation that cigarette smoke poses to some workers is reaffirmed in this series. Cigarette smoke is the only other factor that is mentioned by a majority of office workers (54%) as a "very" or "somewhat" serious problem.

A variety of physical ailments (congested nose, eye irritations, difficulty in breathing, and headaches) group closely together to form the next tier of problems. Each are cited by roughly 40% of respondents as a "very" or "somewhat" serious symptom related to the air quality where they work.

An assortment of problems are mentioned by about one in three respondents as being at least "somewhat" serious. These include dust, cigar or pipe smoke, body odors, excessive heat in the winter, and too cold in the summer.

Finally, workers mention chemical irritants (19%) and paint fumes (13%) least frequently as the source of poor air quality in the office.

TABLE 10

Question. [If respondent OFTEN or SOMETIMES has difficulty doing his/her work because of the air quality in the office or area where he/she works]. Is/Are [each item listed] a very, somewhat, not very, or not at all serious problem because of the air quality in the office or work area where you work?

	very serious	somewhat serious	not very serious	not at all serious	not sure
Internal environment					
lack of air movement	30%	37%	13%	21%	-
cigarette smoke	27	27	10	35	1
being too hot in the summer	24	37	9	30	-
stagnant or still air	22	33	10	35	-
being too cold in the winter	20	33	16	30	2
cigar or pipe smoke	18	15	12	52	3
being too humid in the summer	17	31	8	44	-
fumes from trucks/buses or cars	14	10	9	67	-
being too hot in the winter	11	23	16	49	2
being too dry in the winter	10	26	12	50	2
being too cold in the summer	10	21	15	54	1
body odors	10	17	16	57	-
fumes from a factory or workshop	10	8	11	70	-
irritating chemicals, such as formaldehyde	10	9	11	69	2
drafts or drafty air	9	17	14	59	2
paint fumes	8	5	12	73	2
gas and vapor fumes from office machines or computer terminals	6	16	14	64	-
Physical reaction					
a tired/sleepy feeling	19%	37%	13%	29%	2%
a congested nose	17	28	21	33	1
eye irritations	17	24	17	41	-
headaches	16	23	17	43	3
dust on furniture or fabrics	12	24	17	46	1
difficulty in breathing	10	30	17	44	-

Base. Those saying that they often or sometimes have difficulty doing their work because of the air quality in the office or area where they work (115).

5. Management response to the issue of air quality in the office

In most offices (67%), top management gets high marks for its responsiveness to the issue of air quality in the office. Among management's strongest advocates are workers who say they enjoy excellent air quality; they are among the most likely to credit management for being very concerned about the air their workers breathe.

Management efforts to improve air quality are clearly visible to office workers. Even though most respondents (82%) report no change in air quality in the past year, almost one in four (24%) recall some recent action by management in this area.

This generally positive appraisal of management should not mask the fact that room for continued improvement does exist. Three in ten workers say that top management does not seem concerned when it comes to the issue of air quality in the office. Among women, who are more dissatisfied than men with most aspects of air quality in the office, this percentage rises to a higher 37%.

Office workers who enjoy satisfactory air quality willingly give management credit for their concern about worker's welfare in this regard. But those who are unhappy with air quality where they work (especially women) hold management accountable for being unresponsive to their problems. Managers who meet the challenge and improve air quality are likely to discover that their efforts are noticed and appreciated by office workers.

Fully two-thirds (67%) of office workers say that management is very (36%) or somewhat (31%) concerned about air quality in the office. However, a significant three in ten say management is not very (14%) or not at all concerned (16%) about this issue.

TABLE 11

Question. Do you feel top management is very, somewhat, not very, or not at all concerned about air quality where you work?

very/somewhat concerned	67%
very concerned	36
somewhat concerned	31
not very/not at all concerned	30%
not very concerned	14
not at all concerned	16
(don't know)	3%

Base. All respondents (600).

Satisfaction with top management's response to air quality in the office predictably runs highest among those who now enjoy good working conditions. Among those most likely to say that top management is very concerned about air quality are those that

- say air quality in their office is excellent
- work in uncrowded conditions
- work in fully enclosed offices

Notably, women (21%) are almost twice as likely as men (12%) to say that top management is not at all concerned about air quality in the area where they work.

TABLE 11A

Question. Do you feel top management is very, somewhat, not very, or not at all concerned about air quality where you work?

	very concerned	somewhat concerned	not very concerned	not at all concerned	don't know
All respondents	36%	31%	14%	16%	3%
Gender					
male	38%	34%	13%	12%	3%
female	32	27	16	21	4
General air quality in office					
excellent	60%	22%	4%	10%	4%
good	31	37	13	15	4
fair/poor	15	33	28	24	1
How crowded work area is					
very/somewhat crowded	24%	35%	17%	21%	3%
not very/not at all crowded	44	29	12	12	3
Type of work area					
fully enclosed	41%	28%	12%	16%	4%
semi-enclosed	31	39	14	14	3
open area	33	30	18	17	2

Base. All respondents (600).

Management efforts to change air quality in the workplace are definitely noticed by office workers. Nearly one in four (24%) of those surveyed say that they are aware of recent action by their management to change air quality. The remaining three in four respondents say they are not aware that any action has been taken in this area.

TABLE 12

Question. Has the management of your company where you work done anything recently that changed air quality?

yes	24%
no	72
(don't know)	4

Base. All respondents (600).

The one in four respondents who recognized management efforts to modify air quality were asked to name the specific nature of the changes. The change volunteered most often is installation of a new air conditioning or heat pump system (23%). A significant number also mentioned installation of a new ventilation system (including ducts and fans) (16%). Since earlier findings show that many office workers who are now dissatisfied with air quality complain about poor ventilation or being too hot in the summer, it is likely that management efforts to rectify air quality problems will continue in this area. (However, it should be pointed out that nearly all (92%) of the workers surveyed say that the air in their office or work areas is now cooled in some way in the summer; only 8% say this is not the case.)

Management is also improving air quality by making sure air conditioning units now in place are kept in good working order. This procedure is mentioned by 16% of these respondents. An equal number (16%) also cite among recent management steps to improve air quality rules designating smoking and non-smoking areas or prohibiting smoking altogether.

TABLE 13

Question. [If respondent says that the management where he/she works has done something recently that changed air quality]. What have they done that changed air quality? [Respondents answered in their owns words. Up to three responses were permitted].

RESPONSES MENTIONING NEW INSTALLATIONS	
air conditioning system/heat pump system	23%
ventilation system/ducts/fans	16
cleaning systems (air filter/scrubber system/flint control system)	9
other equipment (precipitator/stand-by system)	5
RESPONSES MENTIONING REPAIR/SERVICE	
repaired/serviced air conditioner/thermostats/heaters/ temperature control	16%
redesigned/improved work areas (new carpeting/painting/windows/ cleaned area/remodeled walls/renovated old building)	14
adjusted/repaired vent ducts/blowers/ventilation system	12
OTHER RESPONSES	
designated smoking and non-smoking areas/prohibited smoking	16%
air quality inspection by management/state health department	8
keep air conditioners on longer	1
other responses	6

Base. Those saying that the management where they work has done something recently that changed air quality (146).

Only one in four office workers say their management has done something recently that changed air quality, but those changes have been largely for the better. About seven in ten (77%) say management efforts resulted in a positive change, while another 20% say that the actions had no real effect. Only a miniscule 1% say that the steps taken resulted in worse air quality.

TABLE 14

Question. Did this change make air quality better or worse; or did it have no real effect?

better	72%
worse	1
no real effect	20
(don't know)	6

Base. Those saying management has done something recently that changed air quality (146).

6. Why are women more critical than men of the air quality where they work?

One fact is evident in these findings right from the opening question in the survey. Women are consistently and often dramatically less satisfied than men both with the general office environment and also with specific aspects of air quality.

This finding is probably linked to the disparity between the reported work conditions enjoyed by men and women. For example, men are more likely than women to work in fully enclosed offices and in offices that have windows. Women report that they spend a good deal more time than men in their assigned work area and are twice as likely as men to be spending at least half their working hours at a computer terminal.

These findings also show that women are staunch believers that better air quality will lead to a more productive office environment. Assuming that managers are concerned about office productivity, women should certainly be considered among the primary targets of management efforts to improve air quality.

A comparative look at working conditions reported by men and women reduces the speculation as to why women are more critical of their working environment, including many aspects of air quality.

- Men are much more likely (54%) than women (39%) to work in fully enclosed offices. Women, on the other hand, are more likely to be in open areas (31%) than are men (20%).
- This office arrangement provides men (71%) with greater access to windows than women (62%).
- Men also enjoy greater mobility in the office than women do. While nearly half (47%) of women say they spend almost all their time in their assigned office or work area, a smaller (29%) of men say the same.
- Notably, women (40%) are only slightly more likely than men (37%) to consider their work areas very or somewhat crowded.

Finally, a comparison of computer/word processor use reveals that women (37%) are twice as likely as men (18%) to spend more than one-half their working hours at a computer terminal. By a 5-to-1 ratio, women (51%) outnumber men (10%) as secretaries, clerical staff, accountants, or bookkeepers. Men, on the other hand, predominate as manager/administrators (men, 29%; women, 12%) and as engineers or scientists (men, 17%; women, 1%).

TABLE 15

	all respondents	men	women
Type of work area			
fully enclosed	49%	54%	39%
semi-enclosed	27	25	29
open area	24	20	31
Whether office has windows			
has windows	68%	71%	62%
does not have windows	32	29	38
Time in assigned office or work area			
almost all of the time	35%	29%	47%
most of the time	39	40	36
only some of the time	24	29	14
almost never	2	2	2
How crowded work area is			
very crowded	9%	8%	12%
somewhat crowded	29	29	28
not very crowded	15	14	16
not at all crowded	47	49	44
Computer/word processor usage			
more than one-half working hours	25%	18%	37%
between one-fourth and one-half working hours	20	18	25
less than one-fourth working hours	53	62	35
(don't know)	3	2	3

Occupation

manager/administrator	23%	29%	12%
scientist/engineer	12	17	1
technician	17	17	17
sales	10	12	7
teacher/instructor	4	4	4
clerical/secretary	18	6	41
accountant/bookkeeper	6	4	10
lawyer	2	2	1
police officer	1	2	4
social worker/counselor	2	1	4
writer	1	4	1
refused	1	1	1

7. How offices are equipped to clean air

Equipment to clean or filter air is a standard feature in just under half (44%) of office buildings today. Tenants of newer buildings (10 years of age or less) are most fortunate in this regard -- over half (55%) of these buildings have cleaning or filtration equipment. Those who occupy buildings 20 years or more in age are least likely (38%) to benefit from this equipment. But there is a trade-off. Older buildings are more likely to have windows (72%) than those 10 years of age or less (66%). And windows in older buildings are also more likely to be "usable" (windows can be opened to supply fresh air) than those in newer buildings.

A plurality (44%) of office workers say that there is currently equipment to clean or filter the air where they work. Almost as many (38%) say this equipment does not exist, and a substantial 18% are not sure whether or not the air where they work is cleaned or filtered.

Building age bears an important relationship as to whether or not equipment exists to filter the air. Over half (55%) of buildings 10 years of age or younger have air filtering equipment; a smaller 38% of those 20 years or older do.

TABLE 16

Question. Do you have any kind of equipment to clean or filter the air where you work?

	yes	no	don't know
All respondents	44%	38%	18%
Age of building			
1-10 years	55%	30%	16%
11-19 years	43	38	19
20 or more years	38	46	17

Base. All respondents (600).

Office workers who are aware that equipment is used to clean or filter the air where they work believe that the filter is part of the air conditioning or heating system (59%). In about one in four cases (26%), respondents say it is a separate unit; only 3% of respondents say their offices are equipped with both types of systems. A significant minority (12%) say they do not know the configuration of the air cleaning system in their offices.

TABLE 17

Question. Is that air cleaning or filtering equipment part of or separate from the air conditioning or heating system?

part of	59%
separate from	26
both	3
(don't know)	12

Base. Those saying there is equipment to clean or filter the air where they work (265).

In offices where respondents say the equipment used to clean or filter the air is wholly or partly separate from the air conditioning or heating system, large floor or ceiling air cleaners hold a slight edge over small desk-top units. A 42% plurality cite the large floor or ceiling cleaners versus 37% who report having small desk-top models. In another 17% of cases both types are in use.

TABLE 18

Question. [Is the equipment used to clean or filter the air] a small desk-top air cleaner, a large floor or ceiling air cleaner, or both?

small desk-top air cleaner	37%
large floor or ceiling air cleaner	42
both	17
(don't know)	3

Base. Those saying that the equipment used to clean or filter the air where they work is wholly or partly separate from the air conditioning or heating system (78).

HONEYWELL TECHNALYSIS

According to those surveyed, the majority (52%) of large air cleaners in offices today are located in the ceiling, while the remaining number are split between those located on the floor (22%) and those that are part of the central air conditioning system (20%).

TABLE 19

Question. Is the large air cleaner located on the floor, the ceiling, or as part of a central air conditioning system?

the floor	22%
the ceiling	52
a central air conditioning system	20
other	4
(don't know)	2

Base. Those saying that there is a large floor or ceiling air cleaner where they work (46).

The issue of ventilation is so central to air quality that it is important to look at windows when considering the ways offices are "equipped" to clean air. It turns out that two out of three respondents say that their office or work area has a window or windows. The likelihood of having a window increases from 66% in buildings 10 years of age or less to 72% in those 20 years of age or more.

TABLE 20

Question. Does your office or work area have a window or windows?

	yes	no	don't know
All respondents	68%	32%	-
Age of building			
1-10 years	66%	34%	-
11-19 years	67	34	-
20 or more years	72	28	1

Base. All respondents (600).

Only 14% of office workers with a window or windows in their work area open it frequently. Nearly six in ten (58%) say the windows are never open while they are working. Of these, 41% say they never open the windows while another 17% state that it is not possible to open the windows in their work area. Another one in ten respondents does not open the windows very often, while the remaining 31% say that they sometimes (17%) or often (14%) do so.

TABLE 21

Question. Do you often, sometimes, not very often, or never open the window or windows while you are working?

often	14%
sometimes	17
not very often	10
never	41
windows can't be opened (volunteered)	17

Base. Those saying that their office or work area has a window or windows (407).

APPENDIX A

DEMOGRAPHIC COMPOSITION OF THE SAMPLE

Gender	male	65%
	female	35
Age	18-25	13%
	26-35	34
	36-45	32
	46-55	14
	56-65	7
	over 65	1
Income	Under $12,000	4%
	$12,000 - 19,999	14
	$20,000 - 34,999	32
	$35,000 - 49,999	24
	$50,000 - and over	18
	(don't know)	3
Occupation	manager/administrator	23%
	clerical/secretary	18
	technician	17
	scientist/engineer	12
	sales	10
	teacher/instructor	4
	accountant/bookkeeper	6
	lawyer	2
	social worker/counselor	2
	police officer	1
	writer	1
	other	3
	refused	1

APPENDIX B: THE QUESTIONNAIRE

1. First, is anyone in your household employed outside the home?

yes

no [Terminate interview.]

2. Do any of these people work outside the home more than 20 hours each week?

yes

no [Terminate interview.]

3. Do any of these people work in an office type setting, that is, at a desk, table, computer terminal, etc.?

yes [Ask to speak to qualified person.]

no [Terminate interview.]

REPEAT INTRODUCTION IF NECESSARY

4. Let me just verify that you work outside your home, more than 20 hours each week, in an office type setting, that is at a desk, table, or computer terminal. Is that correct?

yes

no [Terminate interview.]

5. Counting yourself, how many persons would you say there are who work in office environment at the company where you work? That is, how many people work at a desk, table, computer terminal, etc.? [If less than five, terminate interview.]

5A. What is your occupation? [Probe. Where do you work/what do you do?]

6. Many things can help to make an office or work area a productive place to work in -- that is, a place where you can get your work done quickly and efficiently. Do you personally feel that [start with x-ed statement] is very, somewhat, not very, or not at all important in helping to make an office or workspace a productive place to work?

	very important	somewhat important	not very important	not at all important	not sure
overall housekeeping	63%	31%	5%	1%	1%
whether the office has been recently redecorated	27	42	20	10	1
the size of the office or workspace	56	37	5	2	1
quiet	55	35	6	3	2
lighting	87	11	1	1	-
temperature	78	20	2	-	-
how close you are in distance to other workers	41	44	9	5	2
the nature of the air	68	25	5	1	2

7. And here are some things that people working in offices may or may not consider problems. In the office or area where you work is/are [start with x-ed statement] a very, somewhat, not very, or not at all serious problem?

	very serious	somewhat serious	not very serious	not at all serious	not sure
noise	16%	25%	21%	37%	1%
dirty surroundings	17	15	20	49	-
temperature	19	28	20	33	1
air quality	18	21	18	44	-
lighting	18	14	16	52	-

8. Just in general -- do you feel the air quality where you work is excellent, good, only fair, or poor?

excellent	32%	
good	44	
only fair	18	
poor	6	
don't know	1	[Go to question 10.]

9. Why do you feel the air quality where you work is [repeat respondent's answer to question 8]? Probe fully: What else about the air quality makes you feel that it is [repeat respondent's answer to question 8]?

NEGATIVE RESPONSES

cigarette smoke	34%
unreliable air conditioning/no temperature control	12
dust/dirt	8
temperature fluctuations (too hot or too cold)	19
poor circulation/ventilation	34
lack of fresh air (no windows/can't open windows)	18
pollution (traffic/industry/asbestos/chemicals/construction)	20
odors in air	13
physical side effects (dry/burning eyes/people getting sick)	10
humidity	4
small work space	1
other	2
don't know	3

POSITIVE RESPONSES

no/not a lot of cigarette smoke	31%
have air conditioning/central heating and air system/reliable air conditioning	24
temperature is always satisfactory (not too hot or too cold)/ nice and cool	12
adequate air circulation/ventilation	23
fresh air (from outdoors/windows)	5
no pollution (industry/chemicals/toxic fumes/asbestos)	13
no bad odors	7
no physical side effects (doesn't affect allergies/ easy to breathe)	6
other	2
not crowded	3
natural environment (trees/country/a lot of plants)	4
clean air/filtered air/clean office environment/no dust	24
comfortable/pleasant (unspecified)	5
no problems (unspecified)	10
don't know	2

10. Just during the past year, has the overall air quality where you work become much better, somewhat better, somewhat worse, or much worse; or has there been no real change?

much better	5%
somewhat better	8
somewhat worse	3
much worse	1
no real change	79
wasn't working here a year ago (volunteered)	3
don't know	1

11. Overall, if the air quality where you work were better than it is now, would better air quality be very, somewhat, not very, or not at all helpful in making your office a more productive place to work in?

very helpful	23%
somewhat helpful	30
not very helpful	16
not at all helpful	28
don't know	4

12. Do you personally often, sometimes, not very often, or never have difficulty doing your work because of the air quality in the office or area where you work?

often	3%
sometimes	17
not very often	19
never	62

ASK THOSE SAYING "OFTEN" OR "SOMETIMES" IN QUESTION 12

13. Is/Are [start with x-ed statement] a very, somewhat, not very, or not at all serious problem because of the air quality in the office or work area where you work?

	very serious	somewhat serious	not very serious	not at all serious	not sure
eye irritations	17%	24%	17%	41%	-
headaches	16	23	17	43	3
a tired/sleepy feeling	19	37	13	29	2
a congested nose	17	28	21	33	1
difficulty in breathing	10	30	17	44	-
stagnant or still air	22	33	10	35	-
body odors	9	17	15	57	-
cigarette smoke	27	27	15	57	-
cigar or pipe smoke	18	14	12	52	3
dust on furniture or fabrics	12	24	17	46	1
paint fumes	8	5	12	73	2
fumes from a factory or workshop	10	8	11	70	-
fumes from trucks/buses or cars	14	10	9	67	-
gas and vapor fumes from office machines or computer terminals	6	16	14	64	-
irritating chemicals, such as formaldehyde	10	9	11	69	2
being too hot in the summer	24	37	9	30	-
being too hot in the winter	11	23	16	49	2
being too cold in the winter	20	33	16	30	2
being too cold in the summer	10	21	14	54	1
drafts or drafty air	9	17	14	59	2
being too dry in the winter	10	26	12	50	2
being too humid in the summer	17	31	8	44	-
lack of air movement	30	37	13	21	-

14. Do you feel top management is very, somewhat, not very, or not at all concerned about air quality where you work?

very concerned	36%
somewhat concerned	31
not very concerned	14
not at all concerned	16
don't know	3

15. Has the management of your company where you work done anything recently that changed air quality?

yes	24%	
no	72	[Go to question 18.]

16. [Ask those saying "yes" in question 15] What have you done that changed air quality? [Probe fully]

RESPONSES MENTIONING NEW INSTALLATIONS

air conditioning system/heat pump system	23%
ventilation system/ducts/fans	16
cleaning systems (air filter/flint control system/scrubber system)	9
other equipment (precipitator/stand-by system/modernized equipment)	5

RESPONSES MENTIONING REPAIR/SERVICE

repaired/serviced air conditioner/thermostats/heaters/ temperature control	16%
adjusted vent ducts/blowers/repaired ventilation system	12
redesigned/improved work areas (new carpeting/painting windows/ cleaned area/remodeled lights, walls/renovated old building)	14

OTHER RESPONSES

keep air conditioners on longer	1%
designated smoking and non-smoking areas/prohibited smoking	16
air quality inspection by management/state health department	8
other	6

17. [Ask those saying "yes" in question 15] Did this change make air quality better or worse; or did it have no real effect?

better	72%
worse	1
no real effect	20
don't know	6

18. Do you have any kind of equipment to clean or filter the air where you work?

yes	44%	
no	38	[Go to question 22.]
don't know	18	[Go to question 22.]

19. [Ask those saying "yes" in question 18] Is that air cleaning or filtering equipment part of or separate from the air conditioning or heating system?

part of	59%	[Go to question 23.]
separate from	26	[Continue.]
both	3	[Continue.]
don't know	12	[Go to question 23.]

20. [Ask those saying "separate from" or "both" in question 19] Is that a: [Read list].

small desk-top air cleaner	37%	[Go to question 23.]
large floor or ceiling air cleaner	42	[Continue.]
both	17	[Continue.]
don't know	3	[Go to question 23.]

21. [Ask those saying "large" or "both" in question 20] Is the large air cleaner located on: [Read list]

the floor	22%
the ceiling	52
a central air conditioning system	20
don't know	2

22. [Ask those saying "no" or "don't know" in question 18] Have you or other people where you work asked your company to install an air cleaner?

yes	5%
no	86
don't know	9

ASK EVERYONE

23. Because of the type of work you do, are you in your assigned office or work area: [Read list]

almost all the time	35%
most of the time	39
only some of the time	24
almost never	2

24. How long have you been located in your current office or work area? Is it: [Read list]

one year or less	24%
more than one but less than five years	47
more than five but less than ten years	18
more than ten years	12

25. Do you feel that your office or work space is very, somewhat, not very, or not at all crowded?

very crowded	9%
somewhat crowded	29
not very crowded	15
not at all crowded	47

26. Which of the following best describe the area in which you work? Is it: [Read list]

a fully enclosed office with floor-to-ceiling walls	49%
a semi-enclosed workspace with partitions or walls that do not go all the way to the ceiling	27
an open area with no partitions between desks	24
don't know	1

27. Does your office or work area have a window or windows?

yes	68%	
no	32	[Go to question 29.]

28. Do you often, sometimes, not very often, or never open the window or windows while you are working?

often	14%
sometimes	17
not very often	10
never	41
windows can't be opened (volunteered)	17

29. About how old is the building in which your office or work area is located? Is it: [Read list]

one year or less	3%
more than one but less than 10 years	32
more than 10 but less than 20 years	29
more than 20 years	33
don't know	3

30. Which floor is your own office or work area located on?

basement	2%
1st floor	57
2nd floor	19
3rd floor	8
4th-5th floor	5
6th-10th floor	5
11th or more	4

31. Does the heat in your office or work area come from: [Read list]

heaters in your room or office	8%
central forced air	76
both central and local	12
no heat (volunteered)	4
don't know	1

32. Is the air in your office or work area cooled in the summer?

yes	92%	
no	8	[Go to instructions at question 34.]
don't know	-	[Go to instructions at question 34.]

33. [Ask those saying "yes" in question 32] Is the air cooled by: [Read list]

a central air conditioning system	85%
individual air conditioners through the walls or windows	9
both central and individual	4
don't know	2

34. [Ask those saying "central" or "both" in question 31 or question 33] Is the air supplied to your office or work area: [Read list]

in the same volume all the time	49%
in varying volumes all the time	32
is it supplied at some times but not at others	15
don't know	4

ASK EVERYONE

35. Does the company for which you work own or rent the building in which your office or work area is located?

owns	64%	
rents	31	
don't know	5	

36. Do you have a computer or word processor available to you in the area where you work?

yes	69%	
no	31	[Go to question 39.]
don't know	-	[Go to question 39.]

37. [Ask those saying "yes" to question 36] During your average or normal work week, do you use your computer (word processor) terminal: [Read list]

more than one-half of your working hours	25%
between one-fourth and one-half of your working hours	20
less than one-fourth of your working hours	53
don't know	2

38. Is the terminal you use attached to: [Read list]

an independent, stand-alone personal computer (word processor)	28%
a large, main-frame computer	30
a master or central processing unit	32
don't know	10

ASK EVERYONE

Now, I'd like to ask you a few last questions for classification purposes only. [Go to question 40.]

39. What is your occupation? [Probe: Where do you work/what do you do?]

manager/administrator	23%
clerical/secretary	18
accountant/bookkeeper	6
technician	17
scientist/engineer	12
lawyer	2
sales	10
writer	1
teacher/instructor	4
social worker/counselor	2
police officer	1
other	3
refused	1

40. What is your age? [Read list only if necessary]

18-25	13%
26-35	34
36-45	32
46-55	14
56-65	7
over 65	1

41. And finally, into which of the following categories does your total annual family income fall before taxes and other deductions. Is it: [Read list]

under $12,000	4%
12,000 but less than 20,000	14
20,000 but less than 35,000	32
35,000 but less than 50,000	24
50,000 and over	18
don't know	3

42. Record respondent's sex

male	65%
female	35